Title: Argument
Filing Date: September , 2003
Address: To Patent Office Examiner Takehiko Tooyama
Identification of the Case
Application Number: 181026/2001
Patent Applicant:
Identification Number: 000005108
Name: HITACHI, LTD.
Agent
Identification Number: 100075096
Name: Yasuo Sakuta
Dispatch Number: 362333
Contents of Argument
Reasons:

(1) About Reason 2

1. The Examiner cited the following publications to demonstrate that the present invention could be easily made based on the inventions disclosed by these publications by a person skilled in the art and concluded that it is unpatentable in accordance with Paragraph 2 of Article 29 of the Patent Law:

Reference 1: Japanese Unexamined Patent Publication No.083899/1982
Reference 2: Japanese Unexamined Patent Publication No. 022925/1992

2. As a result of careful examination of the above publications, the applicant decides to make an amendment to the specification in the form of a written amendment which we file along with this argument. This amendment clarifies the features of the present invention.
The amendment includes a modification which further limits the invention claimed in Claim 1 and an additional claim dependent on Claim 1, Claim 2.
If you accept this amendment, we think that clearly the amended invention cannot be made easily based on the inventions disclosed in the above publications. We hope you will examine it and make a decision to acknowledge its patentability.

3. The invention claimed in the new Claim 1 is as follows:
"A method of transferring an optical supervisory signal in an optical transmission system which multiplexes an optical data signal and an optical supervisory signal

containing optical transmission system monitoring information and transmits them through an optical transmission line, the method comprising the steps of:

receiving an optical data signal and a first optical supervisory signal which have been multiplexed and transmitted, from a first optical transmission line;

demultiplexing said received optical data signal and first optical supervisory signal;

optically amplifying said demultiplexed optical data signal by an optical amplifier;

converting said demultiplexed first optical supervisory signal into a first electric supervisory signal;

converting said first electric supervisory signal into a second electric supervisory signal;

converting said second electric supervisory signal into a second optical supervisory signal; and

multiplexing said amplified optical data signal and said second optical supervisory signal; and

sending said multiplexed optical data signal and second optical supervisory signal to a second optical transmission line,

wherein the wavelength of said first optical supervisory signal or said second optical supervisory signal is out of the amplification range of said optical amplifier and the wavelength of said second optical supervisory signal is such a wavelength that its transmission loss in said second optical transmission line is virtually the same as transmission loss of said optical data signal in said second optical transmission line."

This method allows monitoring of an optical transmission line and transfer of supervisory information without an output power drop during amplification of an optical data signal by an optical amplifier.

4. The invention described in Reference 1 concerns a technique that a main signal is regenerated/repeated or simply passed and a supervisory signal is regenerated/repeated after its frequency is varied from station to station. The invention described in Reference 2 concerns a technique that exciting light is modulated and thus also used as supervisory light.

5. On the other hand, as clearly indicated by the amended or new Claim 1, the

received optical data signal and optical supervisory signal are first divided (demultiplexed) and then the demultiplexed optical data signal is optically amplified so that the gain of the optical data signal cannot drop. After that, the optical data signal multiplexed with exciting light is amplified by an optical amplifier and then the amplified optical data signal is multiplexed with the optical supervisory signal and sent to an optical transmission line. Here, the wavelength of the optical supervisory signal is out of the amplification range of the optical amplifier and such a wavelength that transmission loss of the optical supervisory signal in the optical transmission line is virtually the same as transmission loss of the optical data signal.

6. According to the Examiner, the technique that an amplified optical data signal with is multiplexed (coupled) with an optical supervisory signal is described in Reference 1, and it is easy for a person skilled in the art to think of using an optical amplification technique for amplifying an optical data signal if the invention described in Reference 2 is adopted.

An object of the invention described in Reference 1 is to facilitate identification of the location of a fault between terminals. In this invention, an optical supervisory signal whose wavelength varies with the repeater between terminals is superimposed on a main signal and each supervisory signal is wavelength-divided and converted into an electric signal at the receiving end to measure the level of each signal. In other words, the purpose of multiplexing and demultiplexing a main signal and an optical supervisory signal in each repeater is to superimpose a fault search current on an optical supervisory signal.

By contrast, the invention claimed in Claim 1 offers a solution to a problem which might result from "optically amplifying" (which is not included in Reference 1). The problem refers to a phenomenon that when an optical data signal is optically amplified together with an optical supervisory signal, the gain of the optical data signal decreases, resulting in a drop in the optical data signal output power. In order to solve the problem, the present invention proposes an approach that before an optical data signal is optically amplified, the optical data signal and optical supervisory signal are demultiplexed and then after the optical data signal is amplified, the optical data signal and optical supervisory signal are multiplexed.

In the invention described in Reference 2, exciting light with a wavelength of approximately 1.48 μm is also used as an optical supervisory signal, and both the main signal and the exciting light/supervisory signal are optically amplified before

being sent to an optical transmission line. In the invention described in Reference 2, exciting light also serves as supervisory light, so this is conceptually different from the invention claimed in Claim 1 in which exciting light and supervisory light are separately outputted. In the invention described in Reference 2, both a main signal and an optical supervisory signal are optically amplified, which would pose the problem that the present invention is intended to solve.
On the other hand, in the invention claimed in Claim 1, an optical supervisory signal and exciting light are separate from each other; the optical data signal and exciting light enter an optical amplifier where the optical data signal is amplified; and the amplified optical data signal is multiplexed with the optical supervisory signal. In addition, the wavelength of the optical supervisory signal is out of the amplification range of the optical amplifier and such a wavelength that transmission loss of the optical supervisory signal in the optical transmission line is virtually the same as transmission loss of the optical data signal. This produces particular effects of preventing a reduction in the gain of the optical data signal due to the optical amplifier and also a decrease in the optical signal transmission distance.

7. As mentioned above, the invention claimed in Claim 1 has a constitution and effects which are not suggested by the cited references. Therefore, we consider that even a person skilled in the art cannot easily think of making the invention claimed in Claim 1 based on the inventions described in References 1 and 2.

8. The newly added Claim 2 is dependent on Claim 1 and limits the wavelength range of the optical supervisory signal. We consider that the invention claimed in Claim 2 is patentable because the invention claimed in Claim 1 meets patentability requirements.

9. As we have explained above, we believe that the inventions of the present application apparently have constitutions and effects which are not suggested by the cited references. We cordially ask you to examine them and make a decision to acknowledge their patentability.

(2) About reason 1

10. Regarding the invention claimed in Claim 1, the Examiner points out that the

expressions "out of the optical amplification range" and "such a wavelength that its transmission loss in a transmission line is virtually the same as transmission loss of the optical data signal" are abstract and do not show the wavelength range concretely and also that which wavelength shown in the specification of this application is relevant is not indicated clearly, and concludes that the claim does not comply with Paragraph 5-2 and Paragraph 6 of Article 36 of the Patent Law.

11. In the amended Claim 1, the expression "out of the optical amplification range" is replaced by the expression "out of the amplification range of said optical amplifier" to make the meaning clearer. In other words, in order to achieve the present invention's object of preventing an output power drop during amplification of an optical data signal by an optical amplifier, it is proposed that the wavelength of the first or second optical supervisory signal is out of the range in which the optical amplifier can amplify it.
Next, the expression "such a wavelength that its transmission loss in a transmission line is virtually the same as transmission loss of the optical data signal" is replaced by the expression "such a wavelength that its transmission loss in said second optical transmission line is virtually the same as transmission loss of said optical data signal in said second optical transmission line" to make the meaning clearer. For the above reason, the wavelength of the optical data signal should be within the range in which the optical amplifier can amplify it and the wavelength of the optical supervisory signal should be out of that amplification range, which means that the wavelength of the optical data signal is inevitably different from that of the optical supervisory signal. Since loss of an optical signal in an optical transmission line depends on its wavelength, if the wavelength of an optical supervisory signal should be determined without this transmission loss into consideration, the optical signal transmission distance might decrease. Therefore, taking transmission loss of the optical data signal in the transmission line into consideration, the present invention proposes to select, for the optical supervisory signal, a wavelength that makes its transmission loss almost equal to transmission loss of the optical data signal. This produces an effect of preventing the optical signal transmission distance from decreasing.

12. The wavelength of the optical supervisory signal which meets the above two conditions depends on the optical amplifier and optical transmission line which are employed. In the specification of the present application, a wavelength range of

1.48 μm to 1.60 μm is indicated as an example.

13. The applicant amends the claims in the form of a written amendment which the applicant files along with this argument to make the clarification as mentioned above.

14. As we have explained above, we believe that the inventions of the present application apparently have constitutions and effects which are not suggested by the cited references. We consider that the amended claims only contain the features indispensable for the constitution of an invention to be patented. So, we cordially ask you to examine them and make a decision to acknowledge their patentability.

[Necessity for proof] Needed